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APPENDIX A

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Petition of the People of the State of)	
California and the Public Utilities)	
Commission of the State of California)	FCC PR File No. 94-SPA
to Retain State Regulatory Authority)	
Over Intrastate Cellular Service Rates)	
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**REPORT OF CHARLES RIVER ASSOCIATES ON THE
PETITION OF THE PEOPLE OF THE STATE OF CALIFORNIA AND
THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA
TO RETAIN STATE REGULATORY AUTHORITY OVER INTRASTATE
CELLULAR SERVICE RATES**

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SUMMARY

The Public Utilities Commission of the State of California ("CPUC" or "Commission") has petitioned the Federal Communications Commission ("FCC") to retain, on an interim basis, its existing regulatory authority over the rates for cellular service within California, including rates for certain unbundled wholesale services whose provision the CPUC has ordered.¹ The basis for the CPUC's petition is its analysis of evidence obtained in connection with its investigation into the wireless industry in California. On the basis of this analysis, the Commission has concluded that "... cellular service in California is not currently competitive, and that market forces are not yet adequate to protect California customers from paying unjust and unreasonable rates for such service."²

In this paper, we show that the analysis in the CPUC's Petition and its related Decision is seriously flawed.³ Once the flaws in the CPUC's analysis are corrected, it is clear that the Commission lacks a sufficient basis for concluding that cellular service in California remains uncompetitive and that rates in the state are unreasonably high.⁴

¹FCC PR File No. 94-SP3, Petition of the People of the State of California and the Public Utilities Commission of the State of California to Retain State Regulatory Authority over Intrastate Cellular Service Rates, August 8, 1994 (hereinafter, "Petition").

²Petition, p. I.

³Decision 94-08-022, The Public Utilities Commission of the State of California, Investigation on the Commission's Own Motion into Mobile Telephone Service and Wireless Communications, August 3, 1994, (hereafter, "Decision").

⁴The CPUC's conclusions regarding the competitiveness of the cellular industry in California focus on wholesale rates, perhaps because of its interest in the welfare of resellers, but much of the evidence it evaluates relates to competition at the retail level.

The CPUC in its Petition cites several indicators of the market power that it attributes to cellular carriers, including: 1) market shares, 2) price levels and changes, 3) earnings, and 4) capacity utilization and expansion. We evaluate the Commission's analysis relating to each of these indicators and show that the Commission's conclusions regarding market power are unsupported.

I. MARKET SHARES

Current and Future Levels of Concentration

On the basis of its analysis of market shares, the CPUC claims that an unacceptable degree of market power resides with the two facilities-based carriers in each cellular service area. However, the Commission's analysis of current and future levels of market concentration in the supply of cellular service does not comport in several important respects with the standard analysis of market shares, described in the Merger Guidelines published jointly by the Department of Justice and Federal Trade Commission,⁵ despite the CPUC's claims to be following the Merger Guidelines in testing for market power.⁶

First, the CPUC constructs a flawed measure of concentration among cellular providers. Rather than measuring market structure from available data and then assessing the likelihood of anticompetitive conduct based on the structure and other characteristics of the market, the Commission begins by assuming that cellular carriers do not compete, and then uses this assumption to measure market structure. In particular, the CPUC assumes that

⁵Department of Justice and Federal Trade Commission Horizontal Merger Guidelines, 1992 (hereinafter, "Merger Guidelines").

⁶Petition, p. 22.

“ ... there is no significant competition between the duopolists and that they together dominate the market[,]”⁷ and then proceeds to calculate the Herfindahl-Hirschman Index (HHI) with the facilities-based carriers’ market shares combined.⁸ The estimated HHI is thus not an independent measure of market structure, but rather a necessary implication of the Commission’s assumption that the carriers do not compete. The HHI estimated by the CPUC is almost twice the level that would be obtained if the carriers’ shares were separated, which is the standard way of measuring market concentration.⁹

Second, the Commission examines the four-year trend in the HHIs for four Metropolitan Statistical Areas (MSAs).¹⁰ The CPUC’s finding that concentration is increasing over time indicates only that resellers are losing market share in several California markets.¹¹ It tells nothing about the degree of competition between the facilities-based carriers. Moreover, the resellers’ loss of share is as consistent with competition as it is with the exercise of market power.¹²

Finally, the CPUC extrapolates from the four-year trend and suggests that, at least in one service area, “ ... the duopolists are gradually eliminating any competition that might have existed in the retail market.”¹³ In reaching this conclusion, however, the CPUC is shortsighted in two ways. First, the Commission derives its conclusion about future reseller shares from

⁷Petition, p. 33.

⁸*Id.*

⁹For example, if the market consists of only two companies with equal market shares, the difference between combining their shares and not is the difference between an HHI of 10,000 and one of 5,000.

¹⁰Petition, p. 33.

¹¹Petition, p. 30 and Appendix E.

¹²For instance, if the facilities-based carriers were more efficient than resellers in providing additional customer services, competition could produce the observed result.

¹³Petition, p. 34.

only a few years of data. Second, and more important, in this analysis it overlooks the emergence of significant competition from providers of new two-way mobile radio services.

Study of Potential Market Shares for Substitutes

Later in its review, the CPUC does undertake to assess the extent to which emerging wireless technologies will reduce concentration in markets for mobile telecommunications services. In doing so, however, the Commission simply accepts forecasts of penetration levels of wireless services to calculate the HHI for a market comprising providers of a number of two-way mobile radio services: cellular service, personal communications service (PCS), enhanced specialized mobile radio (ESMR), and satellite service. To get market shares for providers of wireless services, the CPUC adopts a 1993 forecast of market penetration for the years 1998 and 2003 from a survey conducted by the Personal Communications Industry Association (PCIA).¹⁴ However, for a number of reasons, the market shares that emerge from these forecasts are likely to understate the extent of competition in wireless communications markets.¹⁵

¹⁴1994 PCS Market Demand Forecast, Personal Communications Industry Association, January 1994. PCIA solicited from industry experts five- and ten-year forecasts of the penetration of each wireless service. PCIA's final forecasts were made using the consensus-building Delphi method. That is, the high and the low responses were removed and the remaining sample data were averaged. The unavailability of the individual survey responses precludes our further analyzing PCIA's forecasting approach. However, were the data available, it would be useful to learn the distribution of forecasts of penetration rates for each service. For symmetric distributions of predicted penetration rates, the sample mean may be a reasonable representation of a consensus prediction. On the other hand, if the distribution is highly skewed, the median response, or some other summary statistic, would be more appropriate. See M. H. DeGroot, Probability and Statistics, 2nd ed., 1986, pp. 208-209. Furthermore, it is interesting to note that the CPUC assumes the market penetration of the various wireless services will be the same regardless of the assumptions made about market concentration. This approach is inconsistent with the premise that concentration is a determinant of pricing and the degree of market competition. If, as the Commission maintains, greater concentration yields markets that are less competitive, penetration levels of wireless services should be higher (and prices lower) in less concentrated markets than in more concentrated markets.

¹⁵In addition to the conceptual errors discussed below, an error in the HHI calculations for the year 2003 leads to an overstatement of market concentration in the maximum concentration scenario for that year. The numbers of subscribers forecasted for ESMR service and satellite service in 1998 are also used as the numbers of subscribers

First, as the Commission itself has remarked, its penetration forecasts have been overly conservative in the past. It notes, for example, that in 1990, “... the CPUC believed it would take approximately five years for cellular service to reach a penetration of 5 percent, (*i.e.*, [by] mid 1995, although penetration rates actually exceeded that in less than two years).”¹⁶

Second, capacity, measured by the amount of spectrum licensed for the provision of wireless services,¹⁷ is superior to subscriber penetration as an indicator of rivals’ ability to respond to a price increase and thereby to curb the exercise of market power. Simply put, if a company has a license to use spectrum to provide wireless service and can readily increase its output, that company’s capacity serves as a better gauge of its competitive significance than does its current output.

The influence of capacity on pricing behavior is recognized in the Merger Guidelines, which allow for inclusion in measures of market concentration the capacity that new entrants would be likely to bring into service in less than one year without significant sunk costs if a significant price increase were to occur in the market.¹⁸ Moreover, economic considerations make expansion by incumbent suppliers likely should a company, alone or in concert with others, attempt to raise prices above competitive levels. In a growing market, where the number of potential future customers exceeds the current customer base, companies already in

to these services in 2003. Correcting for this error lowers the estimated HHI from 2,160 to 2,140 in the maximum-concentration scenario for 2003. Although the same error is made in the minimum concentration scenario for 2003, the net effect on the HHI there is negligible. We present alternative calculations of market shares and concentration in Tables 1 to 4 below.

¹⁶Petition, p. 14 (emphasis added).

¹⁷A carrier’s effective capacity is not necessarily measured solely by the amount of bandwidth it is licensed to use. For example, the capacity represented by a given amount of bandwidth is increased substantially if digital rather than analog technology is used to provide cellular service.

¹⁸Merger Guidelines, Section 1.32.

the industry have a strong profit incentive to expand output. At a minimum, the Commission's use of forecast penetration rates overstates market concentration by implicitly assuming that no provider of wireless services will be operating with excess capacity.

In the market for two-way mobile radio services, license holders will have already overcome the principal barrier to entry. For them, the primary cost of increasing output in response to an exercise of market power may be approximated by the incremental cost of expanding their productive facilities. In a market that is experiencing rapid expansion, such as the market for mobile services, this cost may not be significant in relation to the additional revenue from increasing output.¹⁹

Recent behavior by California cellular carriers also demonstrates that current output understates the future competitive significance of rivals. For example, there are indicators that Los Angeles cellular carriers have already lowered price in anticipation of Nextel's emergence as a competitor.²⁰ In addition, Nextel has complained to the CPUC that the facilities-based cellular carriers have adopted a strategy of converting customers to "long-term" contracts prior to Nextel's entry into the market.²¹ Indeed, the CPUC itself, in discussing discount plans, notes with disapproval that "... carriers are anxious to sign consumers onto long-term

¹⁹Over the next ten years, wireless communications will be among the fastest growing industries. PCIA's survey predicts growth rates between 1993 and 1998 of 154.4 percent for cellular service, 245.7 percent for SMR/ESMR, and 1224.0 percent for satellite service. (The 5-year growth rate for PCS could not be calculated because there was no subscriber base in 1993. Penetration of that service is expected to be 3 percent by 1998, however, which would imply an extremely rapid rate of expansion.) Forecasts of annual growth rates decline in the second 5-year period, but continue to be extremely high, ranging from 58 percent for cellular service to 264 percent for PCS. See 1994 PCS Market Demand Forecast, Table entitled "PCS Technologies Forecast, 1993-2003," unnumbered page.

²⁰Kent Gibbons, "Nextel's Nationwide Phone Plans Given Capital, High-Tech Boost," The Washington Times, November 10, 1993, Section B, p. 9.

²¹Petition, p. 74.

contracts, in part to keep them from changing to emerging technologies.”²² If the Commission’s assessment of the discounts is correct, then the prospect of competition from these providers of wireless services using emerging technologies is already affecting the pricing behavior of cellular carriers, despite the providers’ low or non-existent market shares today.

The Merger Guidelines point out that “[m]arket concentration and market share data of necessity are based on historical evidence. However, recent or ongoing changes in the market may indicate that the current market share of a particular firm either understates or overstates the firm’s future competitive significance.”²³ It is clear that potential competition can constrain pricing behavior. Thus, in such a rapidly evolving market as wireless communications, market shares based on providers’ current output will overstate market concentration.

Concentration Among Providers of Wireless Services

Charles River Associates has calculated market concentration using effective capacity as an indicator of the ability of wireless carriers to respond to price increases and therefore to curb the exercise of market power. For the reasons given above, effective capacity, as measured by available spectrum adjusted for the mix of digital and analog technologies used to provide wireless services, is a more accurate indicator than market-penetration forecasts of the shares that should be assigned to wireless carriers in measuring market concentration.²⁴

Tables 1 to 4 present the HHI for four configurations of the market for wireless services. In the first pair of tables, we assume that the FCC awards six PCS licenses, three for

²² Petition, p. 43.

²³ Merger Guidelines, Section 1.521.

²⁴ The calculation of effective capacity, and the assumptions that underlie it, can be found in “An Antitrust Analysis of the Market for Mobile Telecommunications Services,” Stanley M. Besen and William B. Burnett, December 8, 1993, pp. 36-41.

30 MHz and three for 10 MHz, and that incumbent cellular carriers obtain no additional spectrum.²⁵ If two cellular carriers compete with six new PCS providers, the resulting HHI is 1,512 (Table 1). If one ESMR provider, such as Nextel, is added, the HHI declines to 1,370 (Table 2). In both instances, the market for mobile radio services is only moderately concentrated according to the Merger Guidelines' standards.²⁶

In the third configuration, we assume that both cellular carriers acquire an additional 10 MHz of spectrum in the PCS auction, the maximum possible for cellular licenses, that the remaining PCS licenses are consolidated to the extent allowed by FCC regulations, and that no ESMR provider is present. The HHI for this market is 2,051 (Table 3). When one ESMR is added to this scenario, however, the HHI drops to 1,845 (Table 4). While the HHIs in Tables 3 and 4 fall (barely) in the range for highly concentrated markets according to the standards of the Merger Guidelines, they are neither abnormally high for American industry generally, nor are they at levels characteristic of industries that are subject to price regulation.

These HHI calculations strongly support two conclusions. First, overall industry concentration will decline greatly as the result of the introduction of PCS and ESMR, with the precise extent determined by the identities of the successful bidders in the PCS auctions and by transactions in the aftermarket. Prior to the emergence of providers of these new wireless services, the HHI, calculated for a market of two cellular carriers, is 5,000. In no case does the HHI fall by less than half with the emergence of additional providers, and in two cases it

²⁵The calculations also assume that cellular carriers must reserve 10 MHz of their capacity to serve customers who use analog equipment, and that digital technology has six times the "throughput" per unit of bandwidth that analog technology does.

²⁶In the Merger Guidelines, Section 1.5, HHI levels between 1,000 and 1,800 indicate a moderately concentrated market.

declines by at least two-thirds. Second, the market share of each of the incumbent cellular operators, as measured by their shares of effective capacity, will decline precipitously with the introduction of PCS and the diffusion of ESMR, from 50 percent to the neighborhood of 10 to 20 percent.

Facilities Ownership

The CPUC asserts that “[i]nterlocking ownership interests among the duopolists are another indication of the control cellular carriers exercise over the market and why competition cannot flourish at this time in the absence of regulatory oversight.”²⁷ However, the Commission adduces no empirical evidence that California cellular carriers (or cellular carriers elsewhere for that matter) have used cellular partnerships as facilitating devices for anticompetitive behavior. In addition, whatever the significance of interlocking ownership interests among cellular carriers now, they will become less important as suppliers of PCS and other substitutes enter the market and begin offering wireless services in competition with cellular carriers.

Conditions of Entry

The requirement of an FCC license to use spectrum has been a barrier to entry into the provision of cellular service. However, this barrier is not one of the carriers’ making, nor is it one that the CPUC can remedy. Moreover, the FCC is on the verge of overseeing large increases in both the number of providers of wireless services and the amount of spectrum available for supplying cellular and other mobile services. This section has shown that these developments will dramatically change the structure of the mobile telecommunications market.

²⁷Petition, p. 27.

By ignoring these changes, or underestimating their importance, the CPUC has fundamentally misperceived the future competitiveness of this market and thus the need for continuing regulation.

Stable Market Shares

The CPUC cites as evidence of market power both the relatively stable wholesale shares of facilities-based carriers and the recent decline in resellers' retail shares. The Commission claims that "[t]he underlying assumption ... that there is no significant competition between the duopolists and that they together dominate the market...is supported in part by the comparable market share between the duopolists ...".²⁸ It also points to the " ... relatively stable market share of facilities-based carriers for their wholesale operation, including sales to resellers over the last five years."²⁹ Finally, it claims that in the Los Angeles and San Francisco Bay Area MSAs, the resellers' market share declined by half between 1989 and 1993, although the data it references are redacted.³⁰ However, the data the Commission uses in support of its conclusion that facilities-based carriers have market power are equally consistent with competition in the cellular market. While the Commission does not rely on these data alone in concluding that there is market power, it does not recognize the ambiguity of its evidence.

Stable market shares do not necessarily imply that firms are dividing the market between themselves through coordinated behavior.³¹ This is particularly true in markets for cellular service, where the two facilities-based carriers have licenses to use the same amount of

²⁸Petition, p. 33.

²⁹Petition, p. 29.

³⁰Petition, p. 30 and Appendix E.

³¹Neither does coordinated behavior necessarily imply stable shares. Cooperating companies may reach market-sharing arrangements, establishing predictable share behavior over time, but those shares may vary from one period to the next. Thus, unstable market shares do not necessarily imply that firms are behaving competitively.

spectrum, and therefore possess the same amount of capacity. Moreover, if cellular carriers are competing vigorously to offer customers special features or services, these enhancements may well be introduced at about the same time. A cellular carrier may be quick to match a competitor's new price and service offering with a new service package of its own. These quick reactions in matching a competitor's offerings will contribute to growth of the market, but shares can be quite stable. Rapid growth and relatively stable shares are precisely the pattern that is observed in cellular service in California markets.

Similarly, market shares that are stable between the facilities-based carriers in a service area, but growing at the expense of resellers, are also not conclusive evidence that the two carriers are coordinating their behavior. The two facilities-based carriers may be able to provide ancillary services to subscribers at lower cost, whether due to economies of scale or other factors. The CPUC gives no indication that it has examined, or even considered, whether the declining market shares of resellers are evidence of effective competition rather than its lack. This example is yet another illustration of the CPUC's propensity to interpret every piece of ambiguous evidence unfavorably to the carriers. Its analysis of carrier market shares and their stability is not an adequate basis for the strong conclusions the Commission has drawn about the cellular carriers' market power.

II. PRICE LEVELS AND CHANGES

The CPUC has also examined the rates of facilities-based cellular carriers to determine if price levels and price changes are consistent with what would be expected in a competitive market. In particular, the Commission has analyzed data on all pricing plans offered by the facilities-based carriers in the top five MSAs and two small Rural Service Areas (RSAs) for

each year from 1989 through 1993.³² After reviewing the available data on rates offered by carriers in both basic plans and discount plans, the CPUC concluded that cellular prices in California are high, have not declined commensurately with costs, and are nearly identical between competing facilities-based carriers.³³ We consider each of these conclusions, and find that none is supported by the available evidence.

Price Levels

The Commission complains that nominal rates for basic plans for both carriers in three of the California service areas it studied did not change during the five years 1989 to 1993.³⁴ However, stable nominal prices imply that real prices have fallen if the general price level has increased. In real terms (that is, adjusted for inflation), rates for basic service have fallen by at least 17 percent, a fact that the CPUC ignores.³⁵ In addition, during this period there were significant enhancements in the quality of cellular service, such as improvements in the quality of call transmission and expansions in the size of the geographic area in which cellular subscribers can call without having to pay additional toll charges.³⁶ When these quality improvements are taken into account, the price declines are even larger.³⁷ Subscribers who

³²Petition, pp. 34-35.

³³Petition, pp. 34-35 and 45-46.

³⁴Petition, p. 38.

³⁵The Consumer Price Index increased by 20 percent during this period, and the implicit price deflator for Gross Domestic Product increased by 17 percent.

³⁶See, for example, the "Comments of the Cellular Carriers Association of California" in I.93-12-007, The Public Utilities Commission of the State of California, Investigation on the Commission's Own Motion into Mobile Telephone Service and Wireless Communications, February 25, 1994, p. 22 (hereinafter, "CCAC Comments").

³⁷Economists recognize that there is an upward bias in price indices when there are improvements in the product or service whose price changes are being measured. See F. M. Fisher and K. Shell, The Economic Theory of Price Indices, 1972, p. 26.

remained on basic-service plans over the entire period were clearly better off in 1993 than in 1989.

Moreover, subscribers have not been restricted to staying with basic-service plans. During the period 1990 to 1994, many new discount plans were offered to cellular subscribers. The charts on retail cellular rates in Appendix B of the response submitted by the Cellular Carriers Association of California in this matter³⁸ indicate that there was substantial migration by cellular subscribers to these discount plans. For instance, in large California cellular markets the percentage of subscribers on discount plans increased from 17 percent in 1990 to 69 percent in 1994, while in markets of medium size the percentage of subscribers on discount plans increased from 29 percent to 77 percent.³⁹ Moreover, data compiled by Ernst and Young show that real rates available to California subscribers on discounted plans declined substantially during the period from 1990 to 1994.⁴⁰

Much of the decline in prices for cellular service that has occurred recently reflects the introduction of new rate plans that have led an increasing number of customers to move from more expensive basic plans to plans that offer substantial discounts. By focusing on basic rates, as the CPUC does, this important form of price competition is ignored, leading to the erroneous conclusion that cellular rates in California have not declined appreciably.

Although the CPUC reviewed data on prices available in discount plans, and acknowledged both the growing prevalence of these plans and the need to take them into

³⁸ Appendix B of the Response of the Cellular Carriers Association of California in this matter (hereinafter, "CCAC Response").

³⁹ Appendix B of CCAC Response. In small markets, the percentage of subscribers on discount plans increased from 4 to 34 percent.

⁴⁰ Appendix B of CCAC Response.

through discount plans were lower than those offered by the basic rate.”⁴² Because of the difficulties of quantifying the impacts of the restrictions and conditions of discount plans,⁴³ however, the CPUC could only note that its analysis was unable to determine whether cellular rates statewide had declined as a result of the increased use of discount plans.⁴⁴

The evidence on subscriber behavior, however, indicates that rates have declined since 1990. The CPUC acknowledges that basic rates declined somewhat during this period although, by considering only nominal rates, it understates the magnitude of the decline. Its complaint appears to be that the decline was not greater. But subscribers who stayed on basic plans are plainly better off than they were in 1990, and those subscribers who switched to discount plans must be better off since they chose to switch. If both groups of subscribers are paying lower rates than they paid in 1990, the conclusion that rates declined overall is inescapable.

Price-Cost Comparisons

The CPUC also compares changes in rates to changes in certain costs in its attempt to measure the extent of market competition. Its analysis is flawed in several ways, however. First, the Commission compares percentage changes in nominal basic rates with percentage changes in real operating expenses per subscriber, a totally inappropriate comparison.⁴⁵ In addition, since most subscribers in California are purchasing cellular service under discount

⁴²Petition, p. 43.

⁴³Not all terms of discount plans impose costs on subscribers, as the CPUC itself notes. Some, such as discounts on telephones, yield additional benefits.

⁴⁴Petition, p. 43.

⁴⁵Petition, pp. 34-35. Both percentage changes are redacted, making further evaluation impossible.

plans, even a comparison of changes in inflation-adjusted basic rates to changes in real operating expenses per subscriber makes little, if any, sense.

Second, the CPUC's comparison of changes in basic rates to changes in capital investment per subscriber is also inappropriate.⁴⁶ Capital investment is related to the expected increase in the number of subscribers, as well as to the stock of capital equipment in place today, not the number of current subscribers, for whom past investments were made. The Commission's comparison ignores the fact that the economic costs of serving existing subscribers would not necessarily change even if no new subscribers were being added and the only need for new investment were to replace capital.⁴⁷

Prices in Other States

The Commission also compares rates for cellular service in California with cellular rates in other states, asserting that “[c]ellular rates of major California carriers remain among the highest in the nation.”⁴⁸ This claim is based in part on a comparison of rates for cellular service for “personal safety and convenience use” made by the National Cellular Resellers Association (NCRA) and appended to the CPUC's Decision. Although it appears that only a small percentage of cellular subscribers pay these rates, the Commission does not consider whether movements in such rates over time are representative of movements in cellular rates generally.

The Commission notes that, according to NCRA, rates for personal safety and convenience use of cellular services increased by an average of 32 percent for carriers in the 30

⁴⁶Petition, pp. 34-35. Again, the percentage changes are redacted.

⁴⁷What the Commission has done is to confuse stocks and flows. Investment is a flow variable, measured by the rate of capital expenditure per period of time, while the number of subscribers measured at some moment in time is a stock variable. Comparing changes in these two variables only obfuscates the issues of whether prices should have fallen and whether prices are competitively determined.

⁴⁸Petition, pp. 45-46.

largest cellular markets between January 1988 and January 1994.⁴⁹ What the CPUC failed to note, however, is that rates in all three California cities included in the survey behaved contrary to the national trend. According to the NCRA data, rates for both cellular carriers in San Francisco declined by 20 percent over the period, the only instance among the thirty cities studied where the rates of both carriers declined. In San Diego, one of only four cities where one carrier reduced its rate, the A-block carrier's rate fell by 19 percent, while the rate for the B-block carrier increased by only 4 percent. In the third city, Los Angeles, rates remained unchanged over the period.⁵⁰ Thus, all three California cities in the NCRA study were included in the handful of major markets where carriers reduced rates for cellular service for personal safety and convenience, or did not raise them, during the period from 1988 to January 1994. Furthermore, adjusted for inflation, rates paid by subscribers for this service fell substantially in all three cities during this period.

The CPUC's claim that rates for cellular service in California are among the highest in the nation is significant because the Commission elsewhere in its Petition observes that California has the "... largest market share of cellular phone users in the U.S[.]" a result it attributes to its regulatory policies.⁵¹ However, it makes no connection between the level of market penetration and the prices being charged. The strong demand for cellular services in California indicates that to subscribers there the offerings of cellular carriers, including the rates being charged, are attractive.

⁴⁹Id.

⁵⁰Decision, Appendix 1.

⁵¹Petition, p. 26.

Price Studies

In its Decision, the CPUC also considered studies that simulate how prices would change were additional entrants allowed to provide cellular service.⁵² For example, it cites a study by two FCC staff members, Evan Kwerel and John Williams, that analyzed the impact of the reallocation of a single UHF television channel in Los Angeles from broadcasting operations to a third cellular telephone system.⁵³ Based on a simple theoretical model of oligopoly pricing and empirical evidence from other industries, Kwerel and Williams concluded that cellular prices in Los Angeles could be expected to fall by approximately 25 percent as a result of introducing a third cellular competitor.⁵⁴

However, even if Kwerel and Williams have correctly analyzed the impact on cellular prices in Los Angeles of the entry of a third cellular operator, their work does not indicate that cellular pricing in Los Angeles is noncompetitive. The effect on price that they estimate results not just from adding a third competitor, but from an increase of 18 MHz in the spectrum allocated to cellular service (that is, spectrum reallocated from UHF broadcasting to cellular service).⁵⁵ The Commission's interpretation of Kwerel and Williams' study confounds the effects of increased competition with the effects of increased spectrum capacity.

Indeed, Kwerel and Williams do not use their analysis to evaluate whether the pricing of cellular service in Los Angeles is competitive. Instead, their purpose is to examine whether spectrum is efficiently allocated between television broadcasting and cellular telephone service.

⁵²Decision, pp. 48-49.

⁵³Evan R. Kwerel and John R. Williams, "Changing Channels: Voluntary Reallocation of UHF Television Spectrum," OPP Working Paper Series, November 1992.

⁵⁴Kwerel and Williams, p. vii.

⁵⁵Id.

They reach no conclusion about the prices of cellular service. Rather, they state: “[o]ur analysis confirmed the preliminary evidence that a significant misallocation of UHF spectrum exists between television broadcasting and cellular telephone service. It suggests that a relatively small shift of spectrum from television broadcasting to a third cellular system in Los Angeles would produce a large net gain in social welfare.”⁵⁶

Price Similarity

The CPUC also notes the similarity of prices between cellular carriers. The Commission states that “While similar prices may be observed in competitive markets, one cannot assume that similar prices always indicate a competitive market.” This statement is perfectly true. However, the statement would also be perfectly true if “noncompetitive” were substituted for “competitive” both times that word appears. As a general proposition, price similarity is as consistent with competitive pricing as it is with noncompetitive pricing.⁵⁷ The fact that the sellers of a product are quoting identical prices, by itself, tells us nothing about the degree of price competition in the market.

Moreover, the CPUC is simply wrong in stating that rates are nearly identical in California cellular markets. Table 5 reports the differences in both basic rates and the optimal rate per minute of service charged by each of the two cellular carriers in five of the nine largest

⁵⁶Op. cit., p. 1. The Morgan Stanley study to which the CPUC apparently referred in its Decision also assumed additional spectrum availability for cellular service or other mobile services in projecting declining prices for cellular service as additional competitors entered the market.

⁵⁷“A common price can mean simply that it is not profitable to charge a lower, or a higher, price than other suppliers are charging. A nearly identical price—or indeed an identical price—among all sellers could as well have been arrived at through independent competition as through a collusive pact. Hence it is not useful evidence of either.” Armen A. Alchian and William R. Allen, Exchange and Production: Competition, Coordination, and Control, 3rd ed. (1983), p. 276.

service areas in California.⁵⁸ The differences were calculated based on the rates in effect on December 31, 1993 for three levels of monthly usage -- 60, 120, and 480 minutes (low, medium, and high volumes, respectively) for both the basic and optimal plans.

Table 5 shows that the rates charged by competing carriers are often quite different. In Sacramento, for example, basic rates differ between carriers by 18 percent for both low-volume and medium-volume usage, and by 15 percent for high-volume usage. There are also significant differences in basic rates between carriers in Bakersfield, Fresno/Visalia, and San Francisco/San Jose for low-volume and medium-volume usage. With respect to these major markets, only in Los Angeles are rates under the carriers' basic rate plans identical, but there are substantial differences between the optimal rates of these carriers, ranging from 8 percent at 480 minutes of usage to 47 percent at 60 minutes of usage.

Significant differences were common for optimal rate plans in virtually all areas. Indeed, rates for the optimal plans were identical in only 3 of the 15 instances examined. Variation in prices ranged between 3 percent and 47 percent, with an average variation of 9.6 percent.

Thus, the CPUC's discussion of price similarity contains an incorrect premise and is also wrong about the facts. Not only would similar prices by themselves not be a reliable indicator of noncompetitive pricing, but there is also considerably more variation in prices between competing carriers than the Commission acknowledges.

⁵⁸Table 5 was prepared by the firm of Ernst & Young at the request of CCAC using tariffed rate plans submitted by CCAC's member carriers. Complete tariffs for both carriers were not available in four of the nine largest markets. Ernst and Young define the optimal rate plan as the plan offering a customer the lowest total cost per minute of use for a given level of usage.

III. EARNINGS

The CPUC cites the earnings of cellular carriers in California as an indicator that the companies possess market power.⁵⁹ It relies on two measures of profitability, carriers' accounting rates of return and Q ratios (the ratio of the market value of a company to the replacement cost of its assets), in support of its claims that the carriers are earning excessive profits. In explaining why it finds the carriers' returns excessive, the Commission discusses the scarcity value of the electromagnetic spectrum allocated to cellular service, as well as issues relating to capacity utilization and expansion. However, its analysis or use of each type of evidence is flawed.

Accounting Rates of Return

The CPUC's conclusion that the returns of cellular carriers are excessive and reflect their market power is undermined by several serious flaws in the Commission's analysis and its use of data on the carriers' earnings. The Commission's discussion of the carriers' accounting rates of return, for example, contains two types of errors. First, the CPUC incorrectly assumes that market power can be inferred from accounting rates of return. Second, even if we assume, for the sake of the argument, that accounting rates of return are reliable indicators of market power, the calculations on which the Commission relies omit the opportunity cost of employing scarce electromagnetic spectrum in the production of cellular service, thereby overstating the carriers' profitability.⁶⁰

⁵⁹"If a cellular firm earns returns consistently above competitive levels, this is an indicator of market power." (Petition, p. 46).

⁶⁰The accounting rates of return are also subject to distortion because certain capital outlays are not included in the companies' investment base, as we explain below.

In considering the carriers' earnings, the CPUC implicitly assumes that accounting rates of return are good proxies for economic rates of return, the measure of profit that is relevant to the issue of monopoly and market power. This assumption is wrong. In a classic article, Franklin M. Fisher and John J. McGowan demonstrated that accounting rates of return, even when corrected for various problems of definition and measurement, are not a reliable measure of economic rates of return. They conclude that " ... there is no way in which one can look at accounting rates of return and infer anything about relative economic profitability or, *a fortiori*, about the presence or absence of monopoly profits."⁶¹

The economic rate of return on an investment is the discount rate that equates the present value of the investment's expected net revenue stream to the initial outlay. Accounting rates of return, on the other hand, are calculated by dividing profits earned in a particular year by a measure of the value of a company's capital assets in that year. But profits in a particular year represent the returns from investments made in past years, while current investments will generate returns in future years and not only (if at all) in the current year. This inherent mismatching in the timing of profits and the investments necessary to generate them reveals nothing about the effect on the company's rate of return from additional investment and an expansion of its output.⁶²

⁶¹Franklin M. Fisher and John J. McGowan, "On the Misuse of Accounting Rates of Return to Infer Monopoly Profits," American Economic Review, 73 (March 1983), p. 90.

⁶²For a fuller discussion of the conceptual problems involved in using accounting rates of return to draw inferences about monopoly profits, see Franklin M. Fisher, John J. McGowan, and Joen E. Greenwood, Folded, Spindled, and Mutilated: Economic Analysis and U.S. v. I.B.M., (1983), pp. 238-242.

Scarcity Value of Spectrum

A second flaw in the CPUC's analysis of carriers' earnings is that the rates of return it examined were calculated by relating profits to only part of the carriers' investment, the net book value of their plant. The scarcity value of the electromagnetic spectrum is omitted from the carriers' investment, apparently on the (incorrect) grounds that licenses to use the spectrum have value only if the cellular carriers have monopoly power. However, the scarcity value of cellular licenses exists independently of any monopoly rents and is appropriately included in the calculation of cellular operators' profitability.⁶³ The omission of the scarcity value of the license from the operators' investments overstates the profitability of their operations.⁶⁴

Economic profits, or rents, may stem from one of two sources: scarcity or monopoly.⁶⁵ A resource may be scarce, that is, available in limited supply, and yet be sold at a competitive price. In this case, scarcity rents will be earned, but these rents will not reflect monopoly power. On the other hand, monopoly rents may be earned when a resource is made artificially scarce in order to increase its selling price.

Scarcity rents arise when a good is in limited supply and consumers are willing to purchase all of the units of the good that can be produced at a price that exceeds the average cost of producing the good. In these circumstances, even if price is determined under competitive conditions, the good will be sold at a price that exceeds its production cost. The rents earned by competitive sellers are due to natural scarcity, and the price serves to allocate

⁶³Whether the cellular operator purchased the license or was awarded it by the FCC, the scarcity value of the license is the discounted future stream of scarcity rents that the operator expects to earn, and should be deducted from earnings in the calculation of each carrier's profitability.

⁶⁴See K.W. Clarkson and R.L. Miller, Industrial Organization (1982), pp. 125-126; and J. M. Henderson and R.E. Quandt, Microeconomic Theory (1958), p. 101.

⁶⁵See, for example, Alchian and Allen, op. cit., p. 189.

the scarce good to those who value it most highly. Because spectrum is limited in general, and the spectrum available for the provision of cellular service has been limited by the FCC, holders of cellular licenses can expect to earn scarcity rents.

The CPUC acknowledges in principle the distinction between scarcity rents and monopoly rents. In its Petition, it recognizes "... that there is a scarcity value related to the limited amount of spectrum available for cellular transmission, and that some portion of cellular profits can be attributed to this scarcity factor ...".⁶⁶ Despite its recognition of the scarcity value of the spectrum allocated to cellular service, however, the CPUC effectively dismisses this factor from its analysis of the profitability of cellular carriers, apparently because it believes that spectrum scarcity is not the only, or the primary, determinant of the value of a cellular carrier's license. Its reasoning, however, reveals a confused understanding of the concept of scarcity value.

The Commission claims that "[i]f spectrum scarcity was the only or primary determinant of license value, we would expect the value per-MHz of licensed spectrum to be roughly equivalent when compared nationally."⁶⁷ This is analogous to saying that if land values are a primary determinant of the value of homes, the price of homes per acre should be the same in Beverly Hills and Lodi. What the Commission fails to recognize, apart from the fact that the "quality" of the spectrum may differ at different frequencies, is that the value of spectrum is determined by the amount of spectrum allocated to a use in relation to the demand for the service it produces in that use.

⁶⁶Petition, p. 57. The Commission believes, however, that it is not appropriate to impute a spectrum value when calculating cellular carriers' rates of return, and it cites the difficulty in quantifying spectrum value as one of the reasons it has not adopted cost-of-service regulation for the industry.

⁶⁷Petition, p. 55.